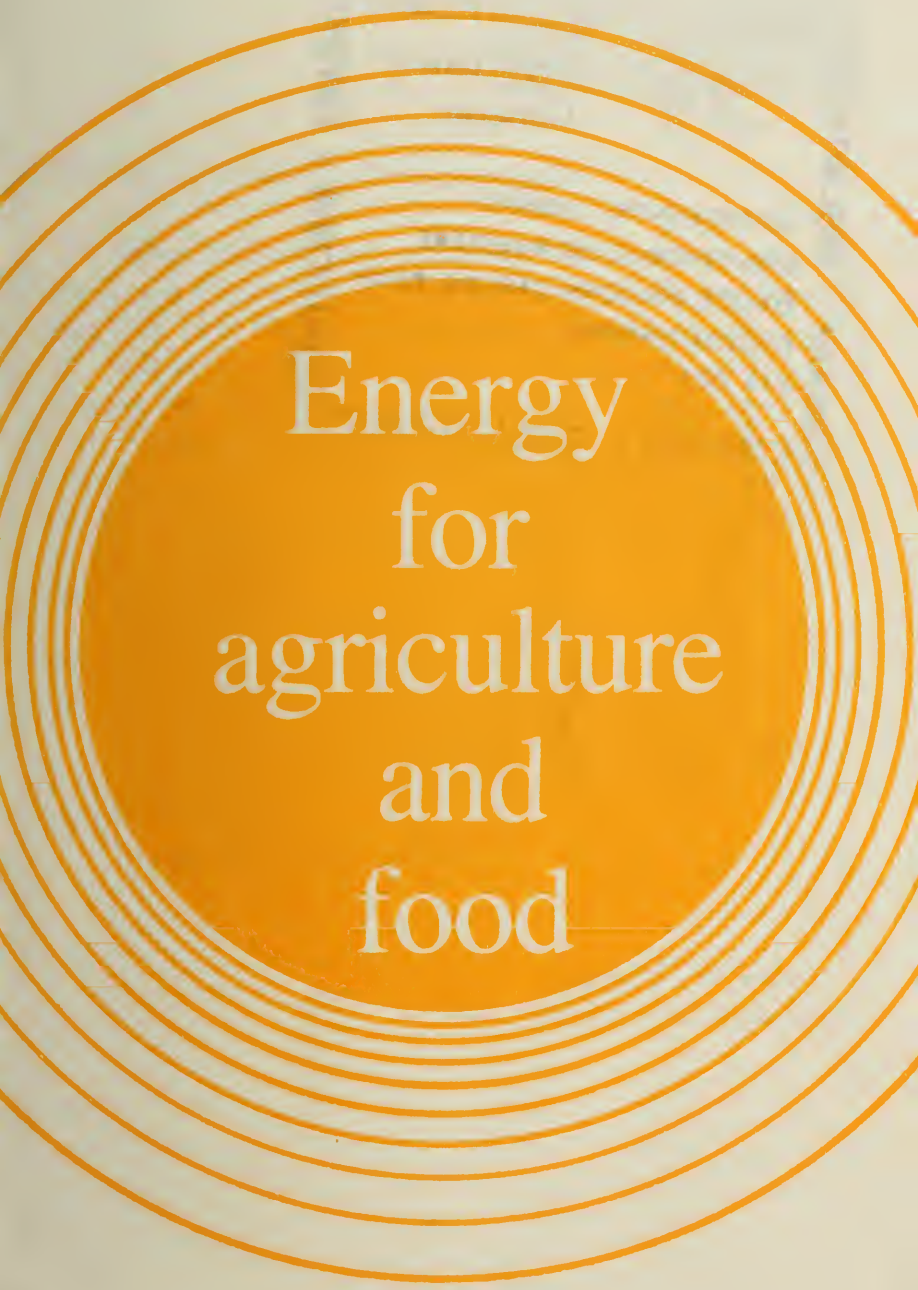




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Energy and the farm community

When you bite into a pork chop or a carrot, it's not very likely you think about the gas, oil and electricity that brought that food from the farm to your kitchen. I don't blame you.

For years, the cost of energy for food production, processing and distribution was negligible. All that is past history. Today, energy costs represent one of the most serious challenges we face. While much progress has been made towards energy security, opportunity and fairness as laid out in the government's National Energy Program, much remains to be done.

Canadians do, however, recognize that they are part of the solution to the energy problem. They understand that fossil fuels are essential to producing human food.

This booklet discusses some of the major questions that I am asked about how rising energy costs will affect the agri-food industry.

I hope you find it useful.

Eugene F. Whelan
Minister of Agriculture

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PUBLICATION 5142, available from
Communications Branch, Agriculture Canada,
Ottawa K1A 0C7

©Minister of Supply and Services Canada 1983
Cat. No. A15—5142/1983E ISBN: 0-662-12452-9
8M—5:83

Également disponible en français

Introduction

This booklet will tell you about Canada's energy situation and our outlook for the future. It specifically answers questions raised by the farming community.

The global situation continues to change. The Iran-related oil price shock of 1979, and the fiscal and monetary responses to it, have caused a marked slowdown in world economic activity and an unprecedented drop in world oil demand. This reduction in demand has put new pressure on OPEC and raised uncertainties about future international oil prices.

In Canada, the world recession with its high inflation and interest rates have produced a dramatic drop in the use of oil and petroleum-based products. In 1981, however, Canada found it could cut its oil use even when the economy was more buoyant. Some had thought the government estimates of 1980 were overly optimistic about the amount of oil that could be saved. It now seems that even these estimates understated the savings possible through improved energy management and conservation.

The food system, which comprises farm production, food processing, packaging, transportation, distribution and household preparation, buys about 15% of Canada's energy. Farm production by itself buys only about 3%.

Agriculture is, however, one of Canada's largest users of liquid petroleum products, consuming 7.9% of the gasoline and 12.2% of the diesel fuel.

Extensive crop production involves fertilizing, spraying, tillage and harvesting. As petroleum fuels must be used for mobile operations, few alternative energy sources can be used.

In the past decade, the overall increase in farming's use of refined petroleum products has been modest, with an increase between 1973 and 1980 of less than 1%. Use of larger tillage equipment, more combined field operations and a continuing switch from gasoline to diesel-fueled tractors have all contributed.

The Canadian food and beverage manufacturing sector is also using far less petroleum. At the same time, use of other energy forms, principally electricity and natural gas, has increased to the extent that the total value of the energy purchased is not much more today than in 1973.

When we consider all sources of energy — crude oil, natural gas, nuclear, hydroelectric, coal and biomass — Canada is an energy-rich country. While Canada's primary problem is with oil, we have made significant reductions in energy demand. By 1990, we should be using 18% less petroleum than in 1980. Oil's share of total energy demand is expected to fall from 38.3% in 1981 to 27.3% in 1990 and still

further to 23.8% by the year 2000. The relative shares of other-energy forms will increase to make up the difference.

Overall, Canada is doing better so far than the initial 1980 National Energy Program forecast. The accompanying table shows oil demand, supply and imports for 1979 to 1982. The moderation in demand, beginning in late 1980, is apparent. Demand fell further in 1981 and is expected to drop more throughout 1982. Oil imports fell in both 1981 and 1982. The message is clear. Imports, once expected to rise dramatically, are now likely to remain below 1980 levels in the coming years.

Canada's oil imports
(thousands of cubic metres per day)

	1979	1980	1981	1982 Forecasts
Demand	290	284	265	246-256
Production	256	244	220	213-215
Adjustments, and stock change	4	2	-4	-7
Net oil imports*	38	42	41	26-34
	(239)	(263)	(260)	(164-214)
Net oil imports under IEA definition ^o	11	18	19	3-11

* Numbers in parentheses are thousands of barrels a day

^o Includes propane, butane and ethane from gas plants

SOURCE: *The National Energy Program - Update 1982*, Pg. 18

How do Canadian fuel prices compare?

The made-in-Canada pricing system resulted from agreements on oil and gas pricing, taxes and incentives. Made between the Government of Canada and producing provinces during 1981-82, these have protected consumers and farmers at the gas pumps.

Canadians often lose track of just how reasonable our petroleum prices are compared to other countries. While domestic prices have increased, our gasoline prices are still far below those of other industrialized countries.

An international comparison of gasoline prices

	Canada	United States	United Kingdom	France	Italy	West Germany
January 1981	30.6	38.9	82.1	88.3	101.5	73.6
July 1981	36.4	42.1	80.3	77.5	86.2	73.0
January 1982	39.3	40.5	81.9	83.7	93.3	74.5
Higher than in Canada by		3%	108%	113%	137%	90%

All prices are in Canadian ¢/L

In Canada, farmers and other businessmen do not pay provincial taxes on fuel for off-road uses. Also, the federal 1.5¢/L excise tax on automotive gasoline for personal use is refundable to farmers (and others) when specified conditions are met. All users do, however, pay a 9% federal sales tax on gasoline and diesel fuel; fuel oil for heating or lighting is exempt from this tax. Two provinces, Alberta and Saskatchewan, subsidize farm fuel prices, and have no provincial sales tax.

Do fuel prices need to rise in Canada?

The national decisions about energy, announced in October, 1980 and updated in mid-1982, are a dynamic and comprehensive response to a constantly changing world.

The government's main goal is to reduce oil consumption through conservation and the use of other, more plentiful fuels. Success depends heavily on the pressure put on users as oil prices rise towards world levels, hence the need for fuel price increases. At the same time, comprehensive legislation and direct action programs will help home owners, businesses and farmers improve energy management, conserve vital fuels and adapt or implement new technology to improve energy efficiency.

How are farmers' costs and incomes affected?

When oil prices increase, farmers pay more for fuel as well as fertilizers, pesticides and other farm inputs that need significant energy to produce and transport. Grain production costs may rise and livestock feed prices might follow. The increases are not the same for each region of Canada, however, or for all types of farming, since each uses varying quantities of these energy-based inputs.

Suppose crude oil prices increased by \$1/barrel, and natural gas prices by \$5.30/1000m³. The estimated increases for the various inputs would be:

Nitrogen fertilizer	1.28¢/kg active ingredient
Phosphate	0.55¢/kg active ingredient
Potash	0.37¢/kg active ingredient
Urea fertilizer	\$ 5.88/t
Anhydrous ammonia	\$10.54/t
Diammonium phosphate	\$ 4.85/t
Muriate of potash	\$ 2.21/t
8-32-16	\$ 3.38/t
Gasoline	0.8¢/L
Pesticides	less than 1%

Total production cost increases

Wheat & barley – summerfallow	Western Canada	\$1.14-1.86/ha
Rapeseed	Western Canada	\$1.41/ha
Wheat & barley grown on stubble	Western Canada	\$1.56/ha
Rapeseed on stubble	Western Canada	\$1.93/ha
Grain corn	Central Canada	\$4.94/ha
Soybeans	Central Canada	\$1.51/ha
Barley	Central Canada	\$1.24/ha
Winter wheat	Central Canada	\$1.61/ha
Potatoes	Atlantic Canada	\$7.95/ha
Oats & barley	Atlantic Canada	\$1.93/ha
Ontario greenhouse		\$1200.00
Western Canada —Hogs		\$0.37/head
Feedlot beef		\$1.16/head
Cow/calf		\$0.63/cow/calf
Eggs		\$0.18/100 doz
Central Canada —Eggs		\$0.20/100 doz
Broilers		\$0.004/bird
Dairy		\$3.11/cow
Atlantic Canada —Hogs		\$0.37/head
Dairy		\$2.24/cow
Feedlot beef		\$1.87/head

The effect of these assumed price increases would be to lower net farm income by 2.8% in Western Canada, 1.6% in Central Canada and 1.5% in Atlantic Canada.

The effect on retail food prices would be increases of 0.2 to 0.5%, depending on the item. The food component of the Consumer Price Index would increase 0.35%.

Remember that these are estimates of short-term results. They do not allow for changes in other input prices resulting

from, for example, higher fossil-fueled transportation costs, substitutions of inputs and changes in farm product prices. Also, the prices of some important farm inputs are determined in world markets. Consequently, if world energy prices are higher than ours, Canadian prices of energy-rich inputs such as nitrogen fertilizers and pesticides will also go up.

Does the federal government subsidize farmers' energy costs?

The National Energy Program provides for a gradual shift to a new oil price system that will blend the costs of oil from all sources into one price. This will ensure that increases do not cause more hardship for those parts of the country that rely on imported oil.

The government won't subsidize farmers' energy costs more than this, however. It would only increase costs to the taxpayer and delay the necessary adjustment to higher energy prices and improved efficiency in energy use. Moreover, such subsidies would damage the competitiveness of the domestic enterprises receiving them and would be difficult to phase out later. Subsidies on farm inputs commonly become built into the capital value of the enterprises receiving them, especially the fixed assets, increasing farm production costs.

Could we go back to the horse?

Fifty years ago, Canadian farmers were largely self-sufficient in terms of fuel; the "fuel" they used was the hay and grain they grew and fed to their work animals. Today, many people believe that a return to these more simple times would benefit us all. This is not necessarily so. The farmer of 50 years ago had at his disposal a total of perhaps 10 horsepower while the farmer of today commands several hundred. In the 1930s, one farmer provided the food and fiber to support about 10 other persons. Today, he produces enough to support more than 50.

To maintain this high productivity the farmer needs "energy-intensive" liquid fuels. Any attempt to return to animal power in Canadian farming has many implications:

- It would probably take about 20 years to raise the number of horses needed to meet today's demand for power;
- A large increase in farm workers would be necessary;
- A large part of farm production would be used to feed the horses, leaving less for humans and resulting in higher food prices.

Even at current and anticipated prices for liquid fuels, farming is still more economical using these fuels, intensive mechanization and petroleum-based inputs such as nitrogen fertilizers and pesticides, rather than by returning to a labor- and animal-intensive agriculture. This is not to deny that at

some time in the future farmers may be able to produce some of their own liquid fuel economically, using products of their own farms. But it would still be difficult, if not impossible, to maintain current output without chemical fertilizers and pesticides.

How is the federal government helping?

Agriculture Canada began funding research into alternate energy sources and energy conservation for farmers in 1974. To date, we've backed research on such things as alcohol fuels, wind power, solar power, methane gas and waste heat and biomass use. Here are some examples of work done:

- Farm crops, animal wastes, crop residues and culls, food processing wastes and forestry products are collectively known as "biomass". Agriculture Canada is assessing the potential for alcohol fuel production from biomass, developing more efficient procedures and new conversion processes, and evaluating the economic viability of various scales of operation. With fossil fuel prices increasing more rapidly than most other input costs, fuel alcohol from agricultural and non-agricultural sources is an attractive possibility. However, alcohol now costs more and cannot compete in price unless exempted from the taxes usually levied on fossil fuels. Canada's oilseed crops are another potential liquid fuel source, several of which produce oil that can be substituted for diesel fuel. A project in Saskatchewan is investigating rapeseed oil to power tractors.
- We're beginning to realize that energy conservation is the best immediate solution. For this reason, Agriculture Canada spends much of its energy research money on development of conservation techniques. Our projects include: developing and testing a fuel monitor that lets farmers operate their equipment more efficiently; evaluating a new crop dryer that uses less fuel (one crop dryer and water heater fueled by straw has been successful in tests); and perfecting heat exchangers and heat recovery devices for livestock structures. Since greenhouse growers have been particularly affected by fuel cost increases, research is emphasizing energy-conserving techniques such as thermal blankets, insulation and more heat-efficient designs for both existing and future greenhouses.
- A study in Ontario tested the idea of an integrated solar heat collector and storage device to heat supplemental ventilation air in animal housing. Designed into the building structure and forming one wall, the method uses a glazed collector over a hollow, concrete block heat storage. This lets the heat gained in the collector be used once the storage reaches its maximum temperature. With an estimated payback period of 3 to 7 years, the device holds

considerable promise and several new structures now incorporate it.

- Several groups are studying the use of industrial waste heat, especially from power generating stations. This appears promising, especially for greenhouses. Another project is under way to determine if heat generated during composting can supplement a greenhouse heating system.
- One study done across Canada assessed the potential of wind generators, as well as analyzing some common wind-use systems. It was apparent that wind power is practical only at specific sites, and then only when displacing electricity generated from fossil fuels. Overall, wind power is not economically attractive at present.

In addition, Agriculture Canada strongly supports the major farm organizations that have voluntarily formed the Farm Energy Management Task Force. The federal government has offered limited funding and technical assistance to ensure that farm organizations are aware of all management programs, grants and other information designed to reduce overall costs while increasing the farmer's efficient use of energy.

What can the farmer do?

As energy, especially liquid fossil fuels, becomes more expensive, it will be profitable to adopt even small changes that result in energy savings. For example, farmers can reduce fuel consumption of their machinery and vehicles by careful adherence to recommended operating speeds and maintenance schedules. They can dry crops with low-temperature systems and use non-liquid fuels such as natural gas, propane, electricity and solar heat. Under the right conditions, larger capacity farm equipment, combined field operations and substitution of herbicides for tillage to control weeds can also produce fuel savings.

Energy can be saved in crop production by carefully monitoring fertilizer, pesticide and irrigation water use. High analysis fertilizers reduce the energy used to transport fertilizers and legume crops in rotations, where feasible, can lessen the need for nitrogen fertilizer. Farmers can make better use of irrigation water through more efficient pumps, application timers and electrical resistance blocks that measure water penetration.

In livestock production, many opportunities exist to reduce the need for liquid fossil fuels. Farmers can substitute other energy sources, improve insulation and ventilation, recover heat from exhaust air, and maintain equipment better. If they control housing temperature for the animals or birds, rather than for their own comfort, they can reduce energy without sacrificing output.

In farming, savings in fuel and other energy are almost always possible. However, these usually need a greater investment in capital and management. More labor may frequently be necessary too. Nevertheless, as energy prices rise, the benefits to the farmer will become more obvious and the rate of payback will accelerate. For the immediate future, more efficient use of existing petroleum and petroleum-based inputs and substitution of natural gas, propane and electricity offer our greatest hope for conserving our dwindling oil supplies and minimizing the effect of rising oil prices.

Properly spaced and located shelterbelts of shrubs, deciduous or coniferous trees also contribute to sound energy management. In addition to their role in reducing soil erosion by wind, slowing down snowmelt runoff and lowering bruising, abrasion and lodging of crops, shelterbelts can significantly reduce heating costs of farm homes and buildings and reduce the need for snow removal from roads, laneways and working areas adjacent to farm buildings. Shelterbelts also contribute to the attractiveness and value of the farmstead.

How is the federal government working with other levels of government, universities and industry?

Canadians have to adjust from a situation where energy has been cheap and plentiful to one where it is more costly and less plentiful, especially from petroleum fuels. This will require special efforts by everyone. Generations of Canadians have come to rely on oil. While possibly justified when oil was relatively cheap and plentiful, we must face new realities.

The federal government has allocated \$114 million to be spent between 1979 and 1985, under energy cost-sharing agreements with the provinces and the private sector. These funds are to promote and demonstrate promising technologies in renewable energy and conservation. In agriculture, such technologies could include application of industrial waste heat in greenhouses and minimum-tillage crop production systems. The provinces are developing the projects.

Agriculture Canada's own program is administered by Agricultural Engineering Research and Development (AERD). It provides funds to industry, universities, other agencies and individuals for projects in energy conservation, renewable energy from biomass, and applications of solar and wind energy to agriculture and the food system. One project has been a University of Manitoba study of the feasibility of using methane gas from animal waste.

Agricultural engineering studies are also done by the Research Branch of Agriculture Canada; the branch now has

a staff of eight concentrating on energy. Other branches plan to get more involved.

The federal government is encouraging greater energy efficiency in industry and small businesses. For example, it has sponsored the formation of voluntary energy conservation task forces covering 15 major sectors of industry and accounting for close to 85% of industrial energy consumed. In 1980, the task forces set targets that ranged from 3% for the ferrous metals industry to 18% for oil refining, based on use in 1974. The target for the food and beverage industry was 15%; it has established a new goal of 22.6% for 1985.

What are the emergency fuel supply plans?

The Energy Supplies Allocation Board was established under the Energy Supplies Emergency Act of 1979. The board's purpose is to deal with national emergencies caused by shortages of petroleum or disturbances in the petroleum market severe enough to affect Canadian security, welfare and economic stability.

The board is under the general direction of the Minister of Energy, Mines and Resources. It has the power to allocate petroleum if a national emergency is declared by the Governor-in-Council and approved by Parliament.

The board's contingency plans consist of a crude oil allocation plan, a petroleum products allocation plan and a gasoline rationing plan. The crude oil plan would give available crude oil from off-shore and domestic sources to refineries on an equitable basis. The petroleum products plan would restrain demand and distribute products to wholesale customers. The gasoline plan is designed to ensure that available supplies of motor gasoline are shared fairly among retail consumers. The board would also regulate prices for the controlled products.

In an emergency, the board will give highest priority to primary food production and the processing of essential perishable food products. We must maintain the flow of essential foods to the public.

Canada is a member of the International Energy Agency (IEA) which would share oil among its 21 members in the event of a severe international petroleum shortage. The agency was established following the oil embargo of 1973 so that in future no single member country would bear the brunt of a serious disruption of petroleum supplies. The group as a whole would share the burden. Thus, even without a disruption of oil shipments to Canada, we might have to implement a mandatory allocation program to meet our commitments to the IEA.

Are there any other publications that can be consulted?

Yes. The following publications are available from Communications Branch, Agriculture Canada, Ottawa K1A 0C7

Alcohol Fuels from Agriculture – A Discussion Paper

Farm-Scale Production and Use of Fuel Alcohol: Opportunities and Problems. Publication 1712. 1980

Conserve Today to Consume Tomorrow. Publication 1707. 1980

And from Energy, Mines and Resources Canada, Ottawa K1A 0E4

Answers to Your Energy Questions

Energy Update

Energy Futures for Canadians (Summary)

An Energy Strategy for Canada (Summary)

The National Energy Program 1980

100 Ways to Save Energy and Money in the Home

Energy Conservation is Good Business

The Car Mileage Book

And from Transport Canada, Public Affairs Branch, Ottawa K1A 0N5

Fuel Consumption Guide (for Automobiles and Light Trucks)

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